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SHORT REPORT

Acute Type A Dissection Treated with Combined Endovascular Repair of Arch and Surgical Bypass of Arch Vessels from Descending Aorta

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We report a case of an endovascular repair of a recurrent dissecting aneurysm of the aortic arch and dissection of carotid vessels, 3 years after surgical repair of aortic valve and ascending aorta for a type A dissection. We performed a bypass from the descending aorta to right, left common carotid artery (CCA), to left subclavian artery with no cardiopulmonary bypass and thereafter, total ascending and aortic arch stent grafting. We suggest considering total aortic arch stent grafting with bypass of arch vessels in cases of complicated acute type A dissection. In cases where the ascending aorta cannot be used as donor site for bypass, we suggest the use of the descending aorta.

Keywords: Endovascular repair; Aortic arch aneurysms; Type A dissections.

Introduction

Endovascular repair or aortic arch aneurysms and dissections has been published in a limited number of centers. The drawback of this procedure is the need for revascularization of arch vessels. In recent years, the combination of surgery and endovascular repair has been used to resolve this problem.

Case Report

We report a case of a 63 year old male who was admitted with chest pain, hypertension, and a transient ischemic attack resulting in a left hemiparesis, which had partially resolved. Past history included a type A dissection of ascending aorta 3 years ago treated by replacement of his ascending aorta and aortic valve. A CTA (computer tomography angiography) of chest and abdomen showed a type A dissecting aneurysm (5.3 cm) of the arch beginning at distal anastomosis of the previous repair (Fig. 1). The dissection continued into the inominate, right carotid, left carotid and left subclavian arteries (Fig. 2). Antihypertensive treatment was initiated and the patient was prepared for a combined procedure: Endovascular repair of the distal ascending aorta and arch combined with an ascending aorta to four vessel bypass, as we previously described.[1]

Initially, a mid-sternotomy was performed. Due to the previous surgery, it was impossible to bypass from the ascending graft with adequate sealing of the arch stent grafts. In addition, our cardiac surgeons decided that the case was not appropriate for open arch repair due to adhesions and friability of the arch. Therefore, a combined endovascular repair and branch bypass procedure was decided upon. In the same stage, a left postero-lateral thoracotomy was performed and a side biting clamp (non-occlusive) was used for anastomosis from the normal descending aorta. No cardio-pulmonary bypass was necessary. A Dacron trouser graft (20–10 mm) was anastomized to descending aorta. The thoracotomy was closed and the graft limbs left in the pleural space.

The limbs were tunnelled through the pleura and pericard (which had been opened during mid-sternotomy), and positioned underneath the left inominate

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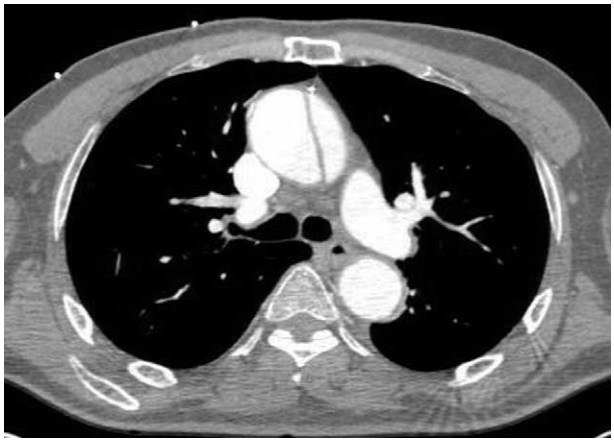

Fig. 1. CTA of chest showing dissection of ascending aorta with normal descending aorta.

vein and anastomosed end to end to the right and left common carotid arteries with a jump graft to left subclavian artery. The right subclavian artery was oversewn. The right common carotid artery's (CCA) false lumen was found thrombosed, as was demonstrated by CTA (Fig. 2). Anastomosis was performed to the true lumen with exclusion of false lumen. The left CCA was thrombosed, a thrombectomy was performed by inserting Fogarty catheter approximately 4 cm proximally with good backflow from the true lumen. No shunt or cerebral monitoring was utilized with minimal clamping time of CCA.

Thereafter, through the right femoral artery, five stent grafts (Talent, Medtronics) were inserted originating at previous repair and terminating at the proximal descending aorta. Intraoperative angiogram showed no leak. A follow-up CTA was performed 1 week after the procedure (Fig. 3).

Recovery post-op included prolonged intubation and the need for tracheostomy. The patient suffered

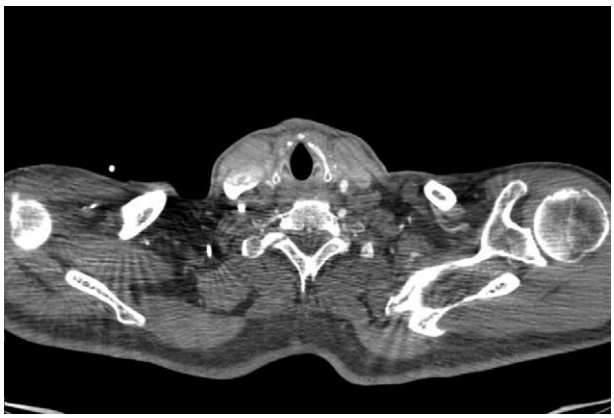

Fig. 2. CTA of neck showing dissection of both common carotid arteries with peripheral contrast material showing their patency.

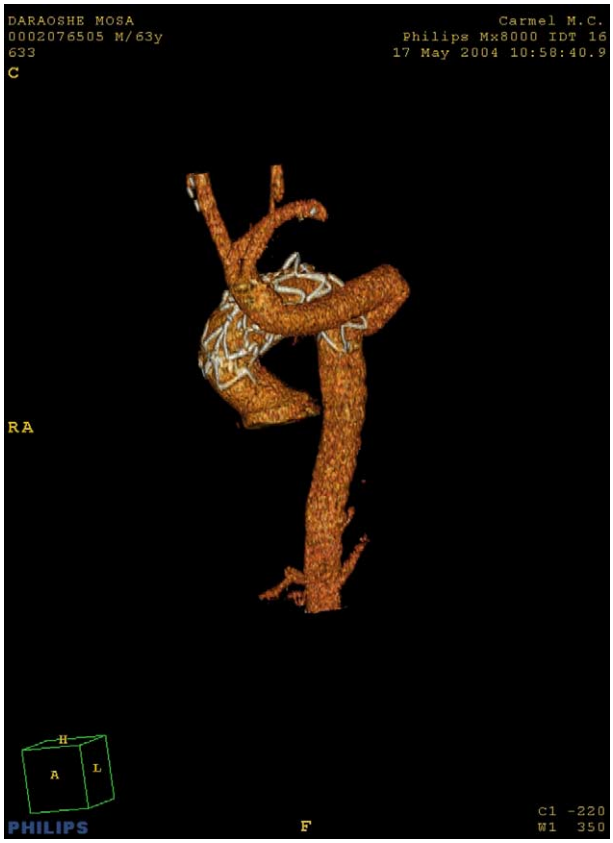

Fig. 3. CTA reconstruction of aortic arch covered with stent graft and bypass from descending aorta to arch vessels.

a left hemiparesis with infarct by brain CT, probably as a result of the dissection, worsening after the procedure. With intensive physiotherapy, left lower limb paresis partially resolved. The patient was fully conscious and coherent. He received enteral nutrition and began tracheostomy weaning. He was discharged 6 weeks after the surgery.

The patient passed away several months later due to massive aspiration.

Discussion

Endovascular repair of ascending aorta and arch pathologies has been more frequently reported in recent years.[2–4] Several techniques for arch vessel revascularization have been described:

1. Branched endografts.[3]
2. Surgical bypasses originating in either the ascending aorta or in cases of incomplete arch coverage, crossover carotid–carotid, subclavian bypasses.[1,2,5]
3. Extra-anatomic bypasses from fem/iliac arteries in isolated cases.[2,5]

The rational of combining endovascular and surgical repair is due to the relative high risks and complications of open repair. A Japanese group reported open stented elephant trunk procedure with ascending and arch replacement with additional descending thoracic aortic endovascular repair due to expansion of residual descending thoracic aorta.[6] Chuter and Schneider described their experience with branched stent grafts and cervical bypasses for endovascular repair of arch and dissections with variable results.[3,4] Keiffer, *et al.* believed that these procedures are dangerous and complicated.[2]

Criado *et al.* published their experience with expanding stent graft applicability to aortic arch pathology with bypass procedures and good results.[5]

In summary, we recommend considering endovascular repair and bypassing of arch vessels in selected cases of aortic arch pathologies such as aortic arch aneurysms, and especially recurrent type A dissections. These combined procedures may minimize complications such as paraplegia, as well as complications due to the use of cardio-pulmonary pump. In our case, where open repair was technically not feasible, we performed a combined endovascular repair of ascending as well as aortic arch with revascularization originating in the normal descending aorta. In addition, revascularization of left subclavian was performed so that there would be access for future blood pressure measurements. In most cases, left subclavian coverage is a tolerable procedure with only a selective group of patients requiring revascularization.[5]

In the future, thoracoscopic assisted aortic procedures may prevent need for thoracotomy in such cases.

References

1 Fajer S, Eyal A, Lubezky N, Karmeli R. Combined surgical and endovascular repair of type B thoracic aortic dissecting aneurysm after failed endovascular treatment. *Eur J Vasc Endovasc Surg* 2004; **27**(5):559–562.

2 Kieffer E, Koskas F, Cluzel P, Behamou A-C, Bahnini A, Chiche L. Endoluminal repair of the aortic arch combined with revascularization of supra-aortic arteries. In: Brancherau A, Jacobs M, eds. *Hybrid vascular procedures*. Blackwell Publishing, 2004:75–84.

3 Chuter TA, Schneider DB, Reilly LM, Lobo EP, Messina LM. Modular branched stent graft for endovascular repair of aortic arch aneurysm and dissection. *J Vasc Surg* 2003;**38**:859–863.

4 Schneider DB, Curry TK, Reilly LM, Kang JW, Messina LM, Chuter TA. Branched endovascular repair or aortic arch aneurysm with a modular stent-graft system. *J Vasc Surg* 2003; **38**:855.

5 Criado FJ, Clark NS, Barnatan MF. Stent graft repair in the aortic arc hand descending thoracic aorta: A 4-year experience. *J Vasc Surg* 2002;**36**:1121–1128.

6 Mizuno T, Toyama M, Tabuchi N, Wu H, Sunamori M. Stented elephant trunk procedure combined with ascending aorta and arch replacement for acute type A aortic dissection. *Eur J Cardiothorac Surg* 2002;**22**:504–509.

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